

Summing up, evidence of recent marine action (shell deposition) was noticed at 28 feet from water level. Supposed remnants of a 25 foot eroded platform were also found. Very coarse quartz grit was found on the south side of the Reach at about 20 feet, a definite ledge was noticed at that height on both sides, and shells were found at the same height on the north side.

The cliffs of Blackwall Reach contribute to the beauty of the river, and it is hoped that roads and houses will not interfere with them. No projected "Blackwall Reach Parade" will equal the beauty of the narrow track that now runs over the top of the southern cliffs.

In closing, thanks are expressed to Mr. Eric Strauss, who took part in some of the excursions to the Reach and repeatedly assisted with transport and measurements.

THE SPREAD OF THE MEDITERRANEAN SNAIL (*Helix pisana*) ON ROTTNEST ISLAND

By D. L. SERVENTY, Nedlands.

During the past two decades the introduced Mediterranean or White Snail (*Helix pisana*) has become established on Rottnest Island and has spread extensively. The species is now found at most of the ports around the South-west coast, probably introduced by shipping, but in most cases is restricted within a small radius and has not extended far into the surrounding countryside.

The period when it first colonised Rottnest Island can be narrowed down to between 1925 and 1927, though in the earlier years of its introduction it was apparently inconspicuous. It was not present in January 1925, when I spent a week at the island, and it is not mentioned in my notes describing a weekend visit in March 1927. The first observer to remark on the presence of the snail was Mr. L. Glauert, of the Western Australian Museum, who found it, around the Settlement only, in August 1927. Dr. E. M. Watson, of the Perth Technical College, who is a frequent visitor to the island, told me in 1935 that the snail had evidently become prominent at Rottnest during the two years he was absent in England (1931 and 1932) as he did not remember seeing it before he left, but it had become firmly established in the Settlement area on his return.

I found the snail extraordinarily conspicuous in the north-west corner of the island in December 1935, when, during a fortnight's holiday, I decided to map its distribution, completing the survey during a weekend visit in January 1936 (Fig. 1). The centre of the area of occurrence was the Settlement, indicating this as the source of infestation. The snail had reached the far (western) end of the Causeway but had not penetrated beyond it. There was none at the main jetty, the snail in this direction having only reached to the Government House grounds.

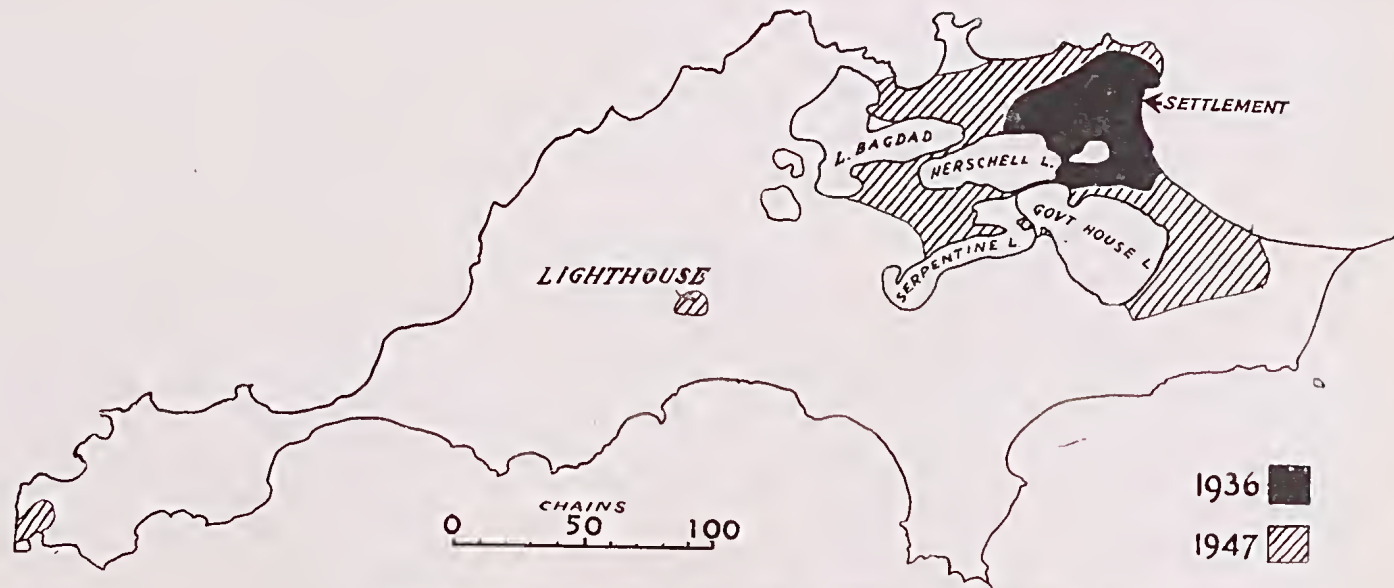


Fig. 1. Rottneast Island, showing the range of *Helix pisana* in 1936 and 1947.

My next visit to the island did not take place until January 1947, when I spent a fortnight's holiday there. I again took the opportunity of mapping the snail's distribution, which had expanded considerably in the intervening 11 years (Fig. 1). The system of salt lakes had been the most serious obstacle to its advance and these still bounded its progress at many places in 1947. The drying out of portions of the lakes in the summer had

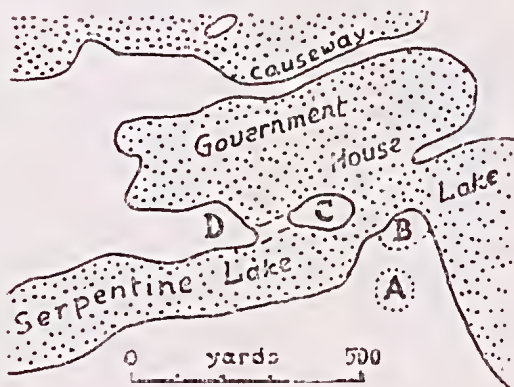


Fig. 2.

enabled a crossing to be established between Government House Lake and Serpentine Lake (Fig. 2). The snail had penetrated from the promontory D to the little islet C (between which was a dry sand-spit at the time), and from C to B, the tip of a promontory on the south-west of Government House Lake. However, it occupied only a very restricted "bridge-head" at B, on the low-lying ground there, and had not yet reached the hill at A. Now that the penetration has been made, however, it should enable a fairly rapid encirclement of Government House Lake and so accelerate the colonisation of the south-east of the island.

Two subsidiary centres of infestation had also appeared. One was around the Main Lighthouse, where the snails, although numerous, were quite localised and appeared to be restricted to the vicinity of the buildings. The other was at the West End, where the snails had no doubt been introduced during the military occupation in the war years. The snail was established to a little north-east of the well and sheds and almost to Cape Vlaming, but was not actually on the tip of the peninsula.

A second species of introduced snail was discovered during this 1947 survey which had not been observed earlier. This was the Dune Snail (*Cochlicella acuta*), whose occurrence in the Fremantle area was first reported by the late G. C. Robson (*Nature*, November 4, 1933, p. 712) on the basis of specimens found by Mr. K. R. Norris. *Cochlicella* was numerous in the Lake Ursula lagoon and extended in the open country a little distance westward, but not as far as Mt. Herschell. The third European snail introduced into Western Australia, the Garden Snail (*Helix aspersa*), so com-

mon in the Fremantle and Perth districts, has not so far been found on Rottneest Island.

Helix pisana occurs in very great profusion almost throughout its area of occurrence and during the summer the aestivating individuals are thickly clustered on bushes, posts and even high up the iron telephone poles. Apparently it is a creature which is singularly free of predators for the exposed clumps of inert snails are outstandingly conspicuous. I have not seen any bird feeding on them. It is to be regretted that an eradication campaign was not instituted originally, when the snail was confined to the Settlement area, on the lines of the effective programmes used in California (cf. A. J. Basinger, *Monthly Bull. Dept. Agric. California*, vol. 16, no. 2, February 1927, p. 51).

The only large indigenous snail on Rottneest approaching the size of *Helix pisana* is *Bothriembryon bulla*, but this is much less apparent than the intruding species. I did not find *Bothriembryon* anywhere in the area of occurrence of *Helix* and one speculated whether the introduced species was supplanting the native one. This has not occurred in some other places on the mainland where I have made observations, as for instance at the mouth of the Moore River and at Hamelin Bay. At the latter place the native *Bothriembryon leeuwinensis* is still plentiful despite *Helix pisana* being thoroughly established. During the 1947 observations at Rottneest I found *Bothriembryon* at the following localities—all outside of the area of occurrence of *Helix pisana*:—Pt. Clune (east promontory of the peninsula), Paterson Beach, Barnett's Gully (near Salmon Bay) and Nancy Cove (near Green Island). Mr. Glauert has recorded *Bothriembryon* also at North Point, north of Bickley Point and at Ricey Beach.

Mainland Occurrences

During recent years I have had the opportunity of examining various parts of the coastline and have made notes of the occurrence of *Helix pisana*. Geraldton appears to be the furthest north locality and I have not seen the species in the beach areas at the Bowes River estuary, the mouth of the Murchison River, the Sharks Bay district, Carnarvon or further north. In the Geraldton area I did not see the snail at Drummond's Cove, 8 miles north of the town (August 1943) but it was plentiful at Southgate's Bay, 5 miles south. It was not seen at the mouth of the Greenough River nor at Dongara. It was abundant at the mouth of the Moore River, but only at the camp-site on the north shore, there being none on the south bank (October 1948).

In the Perth-Fremantle metropolitan district it occurs as far inland as Crawley, Subiaco, within the City of Perth (in the Museum grounds), at Burswood Island and Victoria Park. The distribution appears to be patchy, however, and is not uniformly continuous. Northwards the snail occurs in the sand dune country to Swanbourne, and thence, intermittently to Whitford's Beach.

Further south I have seen the snail at Point Peron, Bunbury, Busselton, Hamelin Bay, Albany, Hopetoun (also at the camping

area on the east shore of the Phillips River estuary, 4 miles west), Esperance and Israelite Bay. In the Hopetoun district a fishing community was established at the 12-miles beach, opposite the Jerdaeutup Lakes, in 1944, and in October 1947 I found one fresh *Helix pisana* there, the first I had seen after several visits; it had evidently been transported thither in the fishermen's gear.

My experience, so far as it goes, is thus corroborative of the distribution already published by P. H. Fiseher (*Journal de Conchyliologie*, vol. 82, 1939, p. 250), who recorded the snail "dans certaines localites cotieres entre Geraldton et Eucla."

NOTES ON THE LEAFLESS ORCHID

Caladenia aphylla Bentham

By Mrs. RICA ERICKSON, Bolgart

March is an unusual month for a bush plant to flower, but that is not the only extraordinary feature of *Caladenia aphylla*. As its name implies it is leafless, at least at the time of flowering. Look for it during March and April and you may be fortunate enough to find some flowers still retaining their dried and shrivelled leaves at the stems' bases. Apparently the leaf develops in spring, dies in summer and decays before the flower blooms. Those I have found are a little longer than broad and are the size of a small finger nail.

The range of this orchid is fairly extensive. My personal acquaintance with it is confined to two localities, Tunney (about 20 miles north of Cranbrook) and Young's Siding (between Albany and Denmark). Flowering in both places took place in late March and April. The late Colonel B. T. Goadby gave me the following list of localities for the species: Collie, Bunbury, Yallingup, Albany, Hay River, Kalgan River, Porongorups, Mount Barren, Cranbrook, Mundurup (the third highest peak in the Stirling Range).

Mrs. E. H. Pelloe's *West Australian Orchids* (1930) includes some of these and adds Tukurua. A friend of mine, who though without botanical pretensions, is positive it may be found at Harvey and I am willing to accept that item, as the flowering date and leafless condition of the plant are both unusual. Near the coast the orchid grows well in sandy soil near stunted jarrahs. Here is the best place to look for the dry leaves. Inland it prefers clay ridges among mallee and prickly scrub. But since few people expect to see orchids before the winter rains it is not often noticed.

The delicate and beautiful flower is about two inches across on a slender, smooth stem about twelve inches tall. It shines like a creamy star. The five perianth segments are nearly equal, slender and tapering. The outer surfaces are dusted brown so that the buds are dusky and scarcely visible. The clear neatness of the unfringed labellum is arresting. It is deeply three-lobed. The spotted lateral lobes curve forward and are upright to form a tube with the column. The projecting middle lobe is rich violet with a recurved tip of yellow. The yellow calli are clublike and arranged in two rows. The base of the labellum is furnished with a claw on which it may be